CLAIMS

What is claimed is:

1.   A network element for receiving a signaling message containing mobile application part (MAP) protocol information and screening the message based on the MAP protocol information, the network element comprising:

(a)   a communication module capable of receiving from a communication network and transmitting to a communication network a signaling message including MAP information;

(b)   a signaling connection control part (SCCP) screening process for receiving the signaling message from the communication module and determining whether the signaling message is a candidate for MAP screening based on at least one SCCP parameter in the signaling message; and

(c)   a MAP screening process for, in response to receiving the message from the SCCP screening process, analyzing the MAP information to determine whether authorization is required for routing the signaling message to a destination node.

2.   The network element of claim 1 wherein, in response to receiving notification from the MAP screening process that authorization is required for the signaling message, the SCCP screening process is adapted to perform authorization screening on the signaling message based on at least one SCCP parameter in the signaling message.

3.   The network element of claim 1 wherein the SCCP screening process examines a subsystem number in a calling party address field in the signaling message to determine whether the node that originated the signaling message is of a type for which MAP screening may be required.

4.   The network element of claim 1 wherein the SCCP screening process examines a subsystem number in a called party address field in the signaling message to determine whether the message is addressed to a destination node type for which MAP screening may be required.

5.   The network element of claim 1 wherein the MAP screening process examines an op code field in the signaling message to determine

whether signaling message is a MAP message type for which authorization may be required.

6.   The network element of claim 5 wherein the MAP screening process is adapted to examine the op code field to determine whether the message is an anytime interrogation (ATI) message.

7.   The network element of claim 5 wherein the MAP screening process is adapted to examine the op code field to determine whether the message is a short message service (SMS) message.

8.   The network element of claim 2 wherein the SCCP process is adapted to perform authorization screening based on a calling party address value in the signaling message.

9.   The network element of claim 8 wherein the SCCP process is adapted to route the message to the destination in response to determining that the signaling message passes the authorization screening.

10.   The network element of claim 9 wherein the SCCP process is adapted to route the message to an Home Location Register (HLR) in response to determining that the signaling message passes the authorization screening.

11.   The network element of claim 9 wherein the SCCP process is adapted to route the message to an visitor Location Register (VLR) in response to determining that the signaling message passes the authorization screening.

12.   The network element of claim 9 wherein the SCCP process is adapted to route the message to an authentication center (AuC) in response to determining that the signaling message passes the authorization screening.

13.   The network element of claim 9 wherein the SCCP process is adapted to route the message to a short message service center (SMSC) in response to determining that the signaling message passes the authorization screening.

14.   The network element of claim 9 wherein the SCCP process is adapted to route the message to an equipment identity register (EIR) in response to determining that the signaling message passes the authorization screening.

15.   The network element of claim 9 wherein the SCCP process is adapted to route the message to a database server in response to determining that the signaling message passes the authorization screening.

16.   The network element of claim 1 wherein the signaling message contains a database query.

17.   The network element of claim 1 wherein the signaling message is an SS7 message.

18.   The network element of claim 1 wherein the signaling message is an Internet Protocol (IP) encapsulated SS7 message.

19.   The network element of claim 16 wherein the SS7 message is IP encapsulated in a transport adapter layer interface packet.

20.   The network element of claim 16 wherein the SS7 message is IP encapsulated in an IETF (Internet Engineering Task Force) adapter layer running over SCTP (Stream Control Transmission Protocol).

21.   A method for determining whether a signaling message received by a network routing element should be discarded or routed to a destination node, the method comprising:

(a)   at a first network element, receiving a signaling message containing mobile application part (MAP) and signaling connection control part (SCCP) information from a communication network;

(b)   determining whether the received signaling message satisfies pre-determined routing requirements by examining at least one of the MAP information and the SCCP information contained in the signaling message; and

(c)   in response to determining that the signaling message satisfies the pre-determined routing requirements, routing the signaling message to a destination node.

22.   The method of claim 21 wherein the signaling message is a Signaling System 7 (SS7) message.

23.   The method of claim 21 wherein the communication network is a Global System for Mobile Communications (GSM) network.

24.   The method of claim 21 wherein the communication network is an American National Standards Institute (ANSI) – 41 based network.

25. The method of claim 21 wherein the destination node is a Home Location Register (HLR).

26. The method of claim 21 wherein the destination node is a Visitor Location Register (VLR).

27. The method of claim 21 wherein the destination node is a Authentication Center (AuC).

28. The method of claim 21 wherein the destination node is a Equipment Identification Register (EIR).

29. The method of claim 21 wherein the destination node is a database server.

30. The method of claim 21 wherein the destination node is a short message service center (SMSC).

31. The method of claim 21 wherein the signaling message contains a database query message.

32. The method of claim 21 wherein the SCCP information includes a Subsystem Number (SSN).

33. The method of claim 21 wherein the MAP information includes a MAP operation (op) code.

34. The method of claim 33 wherein the MAP information includes a subscriber location parameter that is associated with the op code.

35. The method of claim 33 wherein the MAP information includes a subscriber state parameter associated with the op code.

36. The method of claim 21 wherein the SCCP information includes an origination address.

37. The method of claim 36 wherein the origination address is an E.164 formatted number.

38. The method of claim 21 wherein the signaling message is an Internet Protocol (IP) encapsulated SS7 message.

39. The method of claim 38 wherein the SS7 message is IP encapsulated using a Transport Adapter Layer Interface (TALI) protocol.

40. The method method of claim 38 wherein the SS7 message is IP encapsulated using an IETF adapter layer running over SCTP.

41. The method of claim 21 wherein the predetermined routing requirements include one or more origination addresses.

42.   The method of claim 21 wherein the predetermined routing requirements include one or more MAP op codes.

43.   The method of claim 21 wherein the predetermined routing requirements include one or more MAP parameters.

44.   The method of claim 43 wherein the MAP parameters include a location value.

45.   The method of claim 43 wherein the MAP parameters include a state value.

46.   The method of claim 21 comprising in response to determining that the signaling message does not satisfy the pre-determined routing requirements, discarding the signaling message.

47.   The method of claim 21 comprising in response to determining that the signaling message does not satisfy the pre-determined routing requirements, sending an error message to an originator of the signaling message.

48.   A system for performing mobile application part (MAP) screening of signaling messages, the system comprising:

(a)   a signaling gateway including a MAP screening module for receiving signaling messages containing MAP information and determining whether to route the messages to a destination node based on the MAP information; and

(b)   a MAP billing system operatively associated with the signaling gateway for generating billing information based on the number of messages routed by the MAP screening module.

49.   The system of claim 48 comprising a short message service center (SMSC) operatively associated with the signaling gateway for sending MAP short message service messages to the signaling gateway.

50.   The system of claim 49 wherein the MAP module is adapted to perform MAP screening for the SMS forward short message (FSM) messages directed to a short message service center (SMSC) and the MAP billing system is adapted to generate billing records based on the number of FSM messages routed by the MAP module.

51.   The system of claim 48 wherein the MAP screening module is adapted to perform MAP screening for anytime interrogation (ATI) queries

and the MAP billing system is adapted to generate billing records based in the number of ATI queries routed by the MAP module.

52.   The system of claim 51 wherein the billing system is adapted to generate billing records based on the number of subscriber location ATI queries routed by the MAP screening module.

53.   The system of claim 51 wherein the billing system is adapted to generate billing records based on the number of subscriber state ATI queries routed by the MAP screening module.